DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang (Metallic conductivity in bamboo-shaped multiwalled nanotubes) in view of Marty (Batch processing of nanometer-scale electrical circuitry based on in situ grown single-walled carbon nanotubes).

3. Jang teaches CVD deposition of nanotubes onto a silicon oxide substrate having a titanium layer with a cobalt catalyst layer as claimed (see Example and figures and pages 619-622)

4. To the extent to which applicant has defined “spreading" the nanotubes on the substrate the growth process described is considered to meet the limitation (see figures); wherein the nanotubes growth spreads over the entirety of the catalyst area. Jan teaches that the diameter or size of the catalytic particles in the Co layer is responsible for the diameter sizes and growth rates of the CNTs (see 620).

5. Jang teaches CVD deposition of CNTs but is silent as to hot filament assisted CVD deposition.

6. Marty teaches hot filament assisted CVD deposition of CNTs grown from a thermally oxidizes silicon wafer (substrate' pg 486 as required by clam 3). The sub micron contact sites or "catalytic anchors" for selective growth of the nanotubes are formed from a 50 nm thick titanium layer followed by a thin Co layer (considered to form a bilayer) formed through e-beam lithography (pg. 486).

7. Regarding claim 6, the titanium layer is taught to be a "thick" layer as claimed (see pg. 486) with a thinner Cobalt layer provided, consistent with the claim language regarding the relative thickness of the two layers of the bilayer.

8. The hot filament CVD process is used to avoid time consuming and difficult manipulation steps to form electrical contacts for desired nanoscale electronic instead allowing growth in a single location (sub-micron) establishing good electrical contact during a single batch growth process (top paragraphs pg. 486 Marty).

9. Regarding the claims to thickness Jang and Marty are silent as to the thickness, but Marty teaches proportions consistent with the claimed ranges and Jang teaches the size and type (Co) of catalyst layer is proportional to nanotube growth and therefore a result effective variable. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed thicknesses, proportional to Marty, and optimize the result effective variable to control diameter (size) and growth rate of the nanotubes in order to provide advantageous properties such as good electrical contact and degree of control and adhesion of the nanotube to the metal contact during growth, given the growth mechanism and catalyst used. No patentable distinction is seen.

10. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the hot filament CVD process of Marty in order to avoid time consuming and difficult manipulation steps to form electrical contacts for desired nanoscale electronic instead allowing growth in a single location (sub-micron) establishing good electrical contact during a single batch growth process (top paragraphs pg. 486 Marty) not available in prior art methods. No patentable distinction is seen.

11. Regarding claim 3, the primary reference teaches silicon oxide and the secondary reference teaches the oxide coated silicon rendering the claimed substrate coating obvious.

12. As discussed above, to the extent to which applicant has defined “spreading" the nanotubes on the substrate the growth process described is considered to meet the limitation (see figures); wherein the nanotubes growth spreads over the entirety of the catalyst area.

13. Further regarding claim 4 and 9, given the substantial similarity in the structure an composition and the use of hot filament CVD growth processes in both the art of record and the instant invention one of ordinary skill would expect that the growth process of "spreading" is substantially the same. It is noted that with respect to product claim 9 the process is not patentably distinct wherein the product is otherwise taught. In the instant case no structural or compositionally distinct product is seen.

Response to Arguments

14. Applicant's arguments filed 6/29/2011 have been fully considered but they are not persuasive.

15. The 112 indefiniteness rejection has been removed due to applicant amendment(s).

16. Applicant has argued that the art of record does not teach specific ratios of the thicknesses of the various layers of the claimed bi-layer. It is noted that the layers of the art of record are taught to be thicknesses that overlap the claimed thicknesses of the layers in the instant invention. No patentable distinction is seen.

17. Applicant's assertion that the art does not address the “tip” or “microtip” of claims 4 and 9 is erroneous. Marty specifically discloses “sub micron contact sites or "catalytic anchors"” in the rejection that are considered to meet the limitation of a “tip" or “microtip” of applicant’s claimed invention; or otherwise render a tip or microtip obvious to one of ordinary skill in order to controlled sizing of the growth area diameter and thus the nanotube size as above (such as in a tip).. No patentable distinction is seen.

18. Rejection(s) maintained.

Conclusion

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL H. MILLER whose telephone number is (571)272-1534. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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